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WAR DEPARTMENT

U.S. Dept. of Army

TECHNICAL MANUAL

INSTRUCTION GUIDE
SPOTTING BOARD M3

March 13, 1942

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TECHNICAL MANUAL
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WAR DEPARTMENT
WASHINGTON, March 16, 1942.

INSTRUCTION GUIDE
SPOTTING BOARD M3

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*This manual supersedes TM 9-2682, January 7, 1941, including C 1, December 11, 1941.

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SECTION I

GENERAL

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1. Purpose.—This manual is published for the information of both the using arms and services and ordnance maintenance personnel.

2. Scope.—This manual covers the underlying theory of the spotting board M3, a detailed description of its parts, complete operating instructions, and necessary care and adjustments. Maintenance operations described may be performed by using arms personnel.

3. References.—The Appendix lists the publications pertaining to the equipment described herein.

SECTION II

DESCRIPTION AND OPERATION

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4. General.—*a.* The spotting board M3 is a fire-control instrument designed primarily for seacoast artillery when bilateral terrestrial observation is available. The instrument determines corrections for range deviations in percent of range and corrections for lateral deviations in angular units.

b. The platen is graduated to read corrections in reference numbers rather than deviations. The spotting board may be used when both spotting stations are located on the same side of the gun-target line, as well as when the stations are located on the opposite sides of the gun-target line. The above features constitute the principal differences between this board and the spotting board M2.

c. It consists of a base casting on which are mounted the orienting and deviation mechanisms, the whole device being supported on a four-legged pipe stand (fig. 4).

5. Theory.—*a.* In the design and construction of spotting boards it has long been a recognized principle that the area surrounding the target should be laid out to an exaggerated scale while the relation of gun, target, and spotting stations might be, for convenience, to a much smaller scale.

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b. Two main divisions of the problem are therefore evident (fig. 2):

(1) To lay out the geometrical situation as a whole in order to get the range and angles from the spotting stations S_1 and S_2 to target T, knowing the gun-target range and the relation of the spotting stations to the gun or directing point.

(2) To use these ranges and angles to a larger scale when setting in the deviations of the splash observed from the spotting stations and to provide a method for converting these to corrections for the gun position.

c. In designing the board the following assumptions were made: That as the line of sight from any station moves away from the target it moves parallel to itself, and that in the vicinity of the target points of equal range from each station are on straight lines perpendicular to the lines of sight. These assumptions are approximately true for the normal ranges to the target.

d. It can be shown (see sec. VI) that—

$$\frac{\Delta R}{R}=\frac{R'}{R}\times\frac{\cos\epsilon}{\sin\beta}\tan\delta+\frac{R''}{R}\times\frac{\cos\theta}{\sin\beta}\tan\delta'$$

and

$$\frac{\Delta L}{R}=\frac{R'}{R}\times\frac{\sin\epsilon}{\sin\beta}\tan\delta+\frac{R''}{R}\times\frac{\sin\theta}{\sin\beta}\tan\delta'$$

but $\frac{\Delta R}{R}$ is proportional to the percentage deviation in range and $\frac{\Delta L}{R}$ is very nearly equal to the lateral deviations in radians. The board therefore may be made to read corrections for range deviations in percentages and corrections for lateral deviations in angular units by giving the platen the proper graduations and setting the deviation disks according to ratios $\frac{R'}{R}$ and $\frac{R''}{R}$. Provision is made for this on the spotting board.

e. In order to solve the first part of the problem the geometrical condition around the gun can be arranged to scale by means of the mechanical construction of the board. The center line represents the gun-target line, the target end being located at the center of the spotting platen. The fiducial edges of the deviation arms represent the lines of sight from the spotting stations. The station arms may be arranged to the proper distance and azimuth with respect to the center of the station arm plate which represents the gun. The plate as a whole may be revolved in azimuth in relation to the target and moved forward and backward to set the proper gun-target range. When all these settings are complete, the edges of the spotting arms in contact with the targs representing the stations S_1 and S_2 will

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be set to the correct angle of sight from the spotting stations to the target and by means of an integral scale the range of this same line can be read. This situation may be gradually modified as the target moves.

f. If the assumptions in *c* above are accepted, it is only necessary to move an edge parallel to these two lines of sight by the amount of deviation observed in the spotting telescopes, note the intersection of the two lines, represented by the movable fiducial edges, and read the corrections for this deviation on the grid of the platen which has been graduated in respect to the target at its center. This requires two devices:

(1) For setting off the observed deviations.

(2) For reading the final corrections.

These must be related to each other.

g. It can be shown that the distance the deviation arm must be displaced due to any observed deviation at a spotting station is equal to R' tan δ. In order to express the deviation as a percentage of R, the above term becomes $\frac{R'}{R}$ tan $\delta \times 100$. In other words, it is necessary to set off the deflection according to the ratio of the ranges. This is accomplished by two logarithmic range scales on the deviation disks. Setting the ranges R and R' opposite each other performs the division. The data computed and plotted at the value of the quotient for the observed deviation will be brought perpendicular to the spotting line and therefore will govern the movement of the deviation arm. Each fiducial edge will assume a position passing through the splash, parallel to the line of sight from S_1 or S_2 to T, and their intersection will therefore mark the point of splash.

h. To read the location of this point in reference to the target, it is necessary to have the platen graduated to an enlarged scale in divisions representing the desired units of correction and computed in relation to the curves on the disks. These disks provide that the scale of the spotting platen in yards to the inch may vary in such a manner that a fixed distance in inches will be equal to 1 percent of the gun target range. The actual graduations are laterally 2 inches equal 1° and in range 1.143 inch equals 1 percent. (See sec. VI.)

6. Operation.—*a.* The gun or directing point is represented by the center of the station arm plate (2, fig. 8), and the spotting stations are represented by the targs (3) located at the ends of the station arms (4). For orientation the targs should be set in azimuth and distance from the gun or directing point, thus reproducing the angle S_1GS_2 (fig. 1). Choose the station arm according to the distance to the

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station and the scale being used, and the side of the gun on which it is located. Place arms in guides (7) with the proper values opposite the indexes and lock in position by means of the eccentric pins (6), turning them in direction of their arrows. Rotate each guide to the proper azimuth reading on the scale of the station arm plate body. Lock tightly in position with screws (5).

b. Rotate the station arm plate to target azimuth by means of handwheel (8, fig. 7), reading degrees on scale (9).

c. The target position is represented by the center of the deviation grid engraved on the platen (15) and is located directly over the spotting arm pivot. To complete the lay-out of the problem the spotting arms (12 and 13) must be set in correct relation to the station arm plate. First rotate knobs (17) until the desired series of numbers for the scale being used appear on scales (16). Then engage the targs (3) in the grooves in the spotting arms.

d. The gun-target range is set off by rotating the handwheel (10) until the correct range is indicated on the appropriate range counter (11), chosen by sliding back the cover on the counter marked with the scale which is being used. This moves the station arm plate along the gun-target line (the longitudinal axis of the board).

e. The targs will now indicate on the integral scale the ranges from spotting stations and the board is ready for computation of the corrections. If the targs are concealed by the spotting platen, it may be withdrawn, after depressing the plunger (26) to permit reading. The platen must be returned to its original position before resuming operation.

f. Rotate the knobs (21) until both indexes on gears (28) are opposite the correct range from the gun on the outer scales (19). Rotate the knobs (20) until each disk (18) indicates the range from its spotting station, obtained as in *e* above.

g. To move the deviation arms (24 and 25) the correct distance parallel to their present setting, set the pointers (22) by means of knobs (23), to the curves corresponding to the deviation readings obtained from the spotting instruments.

h. The corrections for the deviation of the splash can now be read at the intersection of the fiducial edges of the deviation arms (24 and 25). The lateral correction will be in degrees and hundredths, read as a reference number with 300 as the normal. The range correction will be in percent, read as a reference number with 300 as the normal.

i. Care must be taken to determine the correct scale to be used in each problem and to be sure that this same scale is set on the range counter and the scales (16) on the spotting arms.

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7. Test problem.—To test the operation of the board, the problem (fig.1) may be solved and the corrections obtained checked against the answers given. Set in the following values according to the instructions of the preceding paragraphs:

Scale=1,200 yards per inch	
Station arm setting—S_1	2,400 yards
S_2	16,800 yards
Station arm azimuth—S_1	340°
S_2	30°
Target azimuth (handwheel (8))	270°
Engage targs	
Gun-target range (handwheel (10))	20,000 yards
Set "Range from gun" (knob (21))	20,000 yards
Read from spotting arm and set (knob (20))	
"Range from spotting station" left	19,311 yards
right	31,910 yards
Set pointers to curves (knob (23)) left	4.375
right	3.502
Read corrections lateral reference No. 450 (+1.5°)	
range reference No. 280 (−2.0 percent)	

Because of the necessity for interpolation in the mechanical operation of the spotting board M3, slight differences between the computed and observed corrections may be obtained.

SECTION III

DESCRIPTION OF MAJOR UNITS

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8. Base.—The base (1, fig. 4) is an aluminum casting supported on a four-legged pipe stand. It houses the range setting drive and the orienting worm drive, the range counters, and the azimuth scale. In turn it provides support for the orienting mechanism and the deviation mechanism. Two removable metal covers underneath protect the mechanisms from dust and shocks.

9. Orienting mechanism.—*a.* The orienting mechanism consists of the station arm plate (2, fig. 8), the station arms (4), the targs (3, fig. 7), the right and left spotting arms (12 and 13), and the related parts which serve to set up the geometrical situation in the field to a small scale on the board.

b. The station arm plate fits over a vertical spindle rotated by handwheel (8), from the orienting worm drive in the base (fig. 14).

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This same drive also rotates the azimuth scale (9), which is graduated from 0 to 360. The station arm plate (fig. 8) carries the station arms (4), which serve to set off to scale the proper distances and angles from gun to stations which are represented by the targs that slip into a hole on the end of the station arms. These arms may be locked in

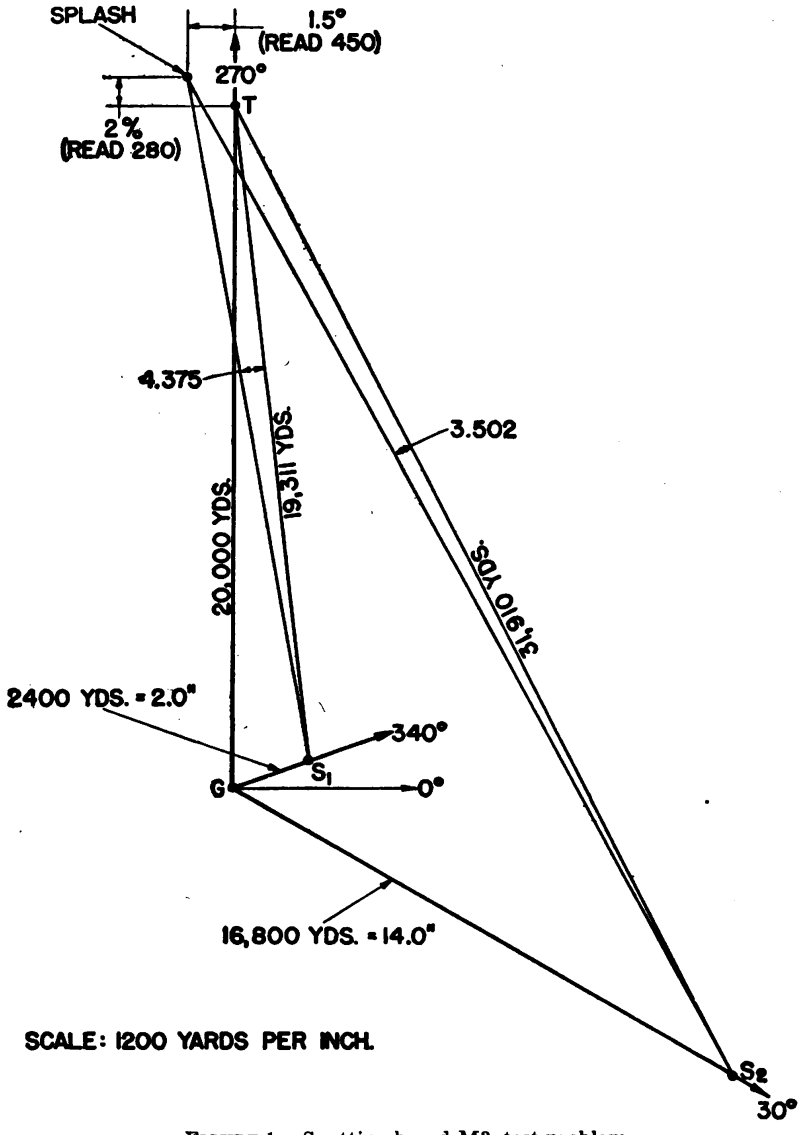

FIGURE 1.—Spotting board M3, test problem.

place by turning the eccentric pins (6) in the direction of their arrows. They can be locked in azimuth setting by tightening the screws (5).

c. The range setting drive (fig. 14) operated by handwheel (10, fig. 7), consists of a lead screw, working through an integral nut on the housing (D43376, fig. 13), which moves the station arm plate, with its arms, along the longitudinal axis of the board. Three spiral gears attached to the same lead screw turn the counters (11, fig. 7), which record, each to its own scale, the gun-target range.

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d. The right and left spotting arms (12 and 13) are pivoted on antifriction bearings about a vertical shaft mounted in bracket (14, fig. 4). The center of this shaft is located directly below the center of the deviation grid engraved on the platen (15, fig. 7), which is also mounted on the bracket (14). The targs engage grooves in the under side of the spotting arms and indicate the range from the spotting stations on the scales (16).

e. The spotting station range scales (16) are graduated and are perforated every ten divisions with an elongated hole through which the numbers on the underlying strips may be read. These strips are engraved with three series of numbers, representing 600, 1,200, and 2,400 yards per inch. The appropriate series of numbers are brought into position by rotating the knobs (17).

f. The spotting board is equipped with two complete station arm plates (2, fig. 8) and eight pairs of station arms (4) of various lengths. This arrangement permits a second gun-spotting station triangulation system to be set up and held in readiness for immediate use.

10. Deviation mechanism.—*a.* The deviation mechanism consists of the deviation disk assemblies, the deviation arms, which are mounted on the spotting arms, and the grid engraved on the platen.

b. The deviation disks (18, fig. 7) are engraved with a series of curves permitting a direct setting of the deviations observed in the telescopes or determined by other means. The black curves are graduated in degrees and hundredths with a 3.00 as the normal. The red curves are graduated in degrees with 20 as the normal, and are used for setting large angular deviations of the splash. The periphery of the disk is graduated with a logarithmic scale in terms of "range from spotting station." This range may be set off opposite the index on gear (28) by turning the knob (20). This index must be pre-positioned opposite the outer scale (19), which is similarly graduated in terms of "range from gun," by manipulation of the knob (21).

c. The pointers (22) may be set to the proper deviation lines on the disks (18) by rotating the knobs (23). This setting will also move the deviation arms (24 and 25) laterally across the spotting arms. The fiducial edges of the deviation arms, representing lines of sight from their respective spotting stations, are always parallel to the inner edges of the spotting arms.

d. The grid is graduated to permit reading corrections for lateral deviations varying from 3° left to 3° right and corrections for range deviations from 6.5 percent "short" to 6.5 percent "over." The 300 mark indicates the normal position in range correction and also in lateral correction.

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e. Depressing the plunger (26) releases a spring catch thereby permitting the platen (15) to be withdrawn to a position which will facilitate reading the correction for the previously marked splash. The platen can also be moved thus when setting for short ranges.

11. Support.—The support (27, fig. 5) fits into a hole in the base (1, fig. 4), the pins in the cross member engaging holes in the extremities of the spotting arms. This arrangement prevents the spotting arms from swinging freely about their pivot when the instrument is not in use.

12. Accessories.—A canvas cover for the spotting board and an accessory chest for the extra station arm plate and station arms are furnished with each instrument.

SECTION IV

ADJUSTMENTS

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13. Checking zero position.—The spotting board is properly adjusted by the manufacturer and with reasonable care should require no adjustment in the field. However, the zero setting of the board may be checked and any necessary adjustments made in the following manner:

a. Select a suitable station arm (4, fig. 8) and set it to zero so that the targ (3) is directly over the center of the station arm plate (2).

b. Engage the targ in one of the spotting arms and turn the handwheel (8, fig. 7) until the scale (9) reads zero azimuth.

c. Set the pointer (22) to the center of the disk (18).

d. When these settings have been effected the station arm plate (2) should be in a position such that the vertical plane through the inner edge of the spotting arm passes through the 0 and 180° graduations of the azimuth circle and the fiducial edge of the deviation arm should coincide with the grid line indicating zero lateral correction.

e. If the station arm plate is not correctly oriented, turn the handwheel (8) until the setting described in *d* above is effected. Remove cover (C77761, fig. 15 (sec. D–D)) and loosen the screws (BCOX3DD) in the azimuth scale assembly and rotate the scale (9, fig. 7) until it reads zero; then tighten the screws.

f. If the fiducial edge of the deviation arm is parallel to the center grid line, but does not coincide with it, turn the knob (23) until coincidence is obtained. Loosen the screws (29) and shift the pointer (22) until it again coincides with the center of disk (18); then tighten

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the screws. This adjustment should be repeated, if necessary, on the other deviation arm.

14. Servicing by ordnance personnel.—If the adjustments described in paragraph 13*e* and *f* are insufficient to provide satisfactory service, the instrument should be serviced by trained ordnance personnel.

SECTION V

CARE AND PRESERVATION

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15. Care in handling.—*a.* The spotting board is not a particularly delicate instrument but it should not be subjected to rough handling.

b. No attempt should be made to force any movement as all moving parts normally operate freely.

c. Particular care should be taken to prevent damaging the edges of the spotting station arms (4) and the T-slots in the guides (7, fig. 8).

16. Lubrication.—All moving parts and bearings should be lubricated occasionally with light oil to insure smoothness of operation. These can be reached by removal of the metal covers underneath the instrument (fig. 14).

17. Storage and transportation.—*a.* The spare station arm plate and station arms should be stored in the accessory chest when not in use (fig. 10).

b. The canvas cover should be placed over the board to exclude dust and dirt when the instrument is not in use.

c. The spotting board should be securely packed in its packing chest for transportation (fig. 9).

SECTION VI

DATA

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Formulas for calculating deviations 19
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18. Weights and dimensions.

Spotting board M3	163½ pounds.
Packed in packing box	260½ pounds.
Accessory chest	53 pounds.
Instrument assembled	29 by 54½ by 32 inches high.
Packing box	31 by 57 by 15 inches high.
Accessory chest	15 13/16 by 37½ by 4 1/16 inches high.

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19. Formulas for calculating deviations.—In figure 2, T represents the target and S the splash. The spotting stations S_1 and S_2 and the directing point DP are not shown, but dotted direction lines to those stations are shown. In designing the spotting board it was assumed that as the line of sight moves away from the target it moves

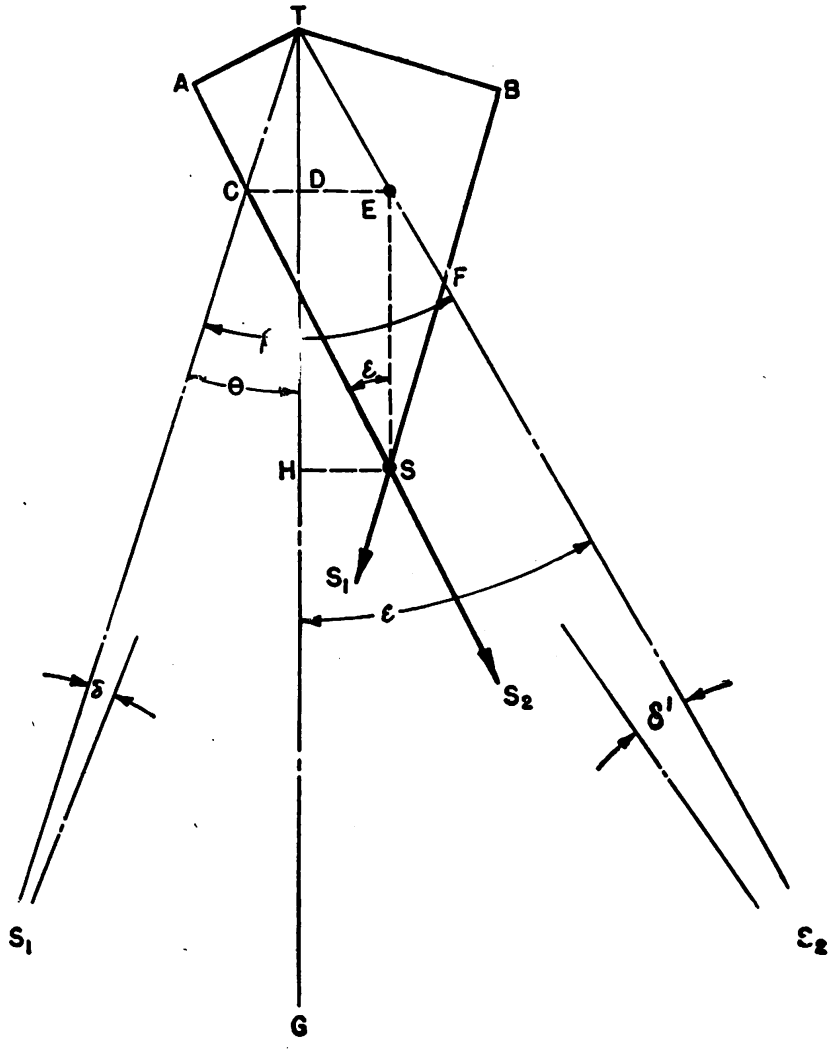

FIGURE 2.—Formulas for calculating deviation.

parallel to itself, and that, in the vicinity of the target, points of equal range from each station lie on straight lines perpendicular to the lines of sight. These assumptions are approximately true for the normal ranges to the target. According to these assumptions, the lines of sight to the splash, BS and AS, are parallel to TS_1 and TS_2, respectively, and BT and AT are perpendicular to those respective lines.

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Equation for range deviation *TH:*

Let R' and R'' equal the target range from spotting stations S_1 and S_2 respectively.

$$AT=R'' \tan \delta'.$$
$$CT=AT/\cos (90°-\beta)=AT/\sin \beta=R'' \tan \delta'/\sin \beta.$$
$$TD=CT \cos \theta=R'' \tan \delta' \cos \theta/\sin \beta.$$
$$BT=R' \tan \delta.$$
$$TF=BT/\cos (90°-\beta)=BT/\sin \beta=R' \tan \delta/\sin \beta.$$
$$CS=TF=R' \tan \delta/\sin \beta.$$
$$DH=ES=CS \cos \epsilon=R' \tan \delta \cos \epsilon/\sin \beta.$$
$$TH=TD+DH.$$
$$TH=\frac{R'' \tan \delta' \cos \theta}{\sin \beta}+\frac{R' \tan \delta \cos \epsilon}{\sin \beta}. \quad (1)$$

Equation for lateral deviation *HS:*

$$BT=R' \tan \delta.$$
$$TF=BT/\cos (90°-\beta)=R' \tan \delta/\sin \beta.$$
$$CS=TF.$$
$$CE=CS \sin \epsilon=R' \tan \delta \sin \epsilon/\sin \beta.$$
$$AT=R''\tan \delta'.$$
$$CT=AT/\cos (90°-\beta)=R'' \tan \delta'/\sin \beta.$$
$$CD=CT \tin \theta=R'' \tan \delta' \sin \theta/\sin \beta.$$
$$HS=CE+(-CD).$$
$$HS=\frac{R' \tan \delta \sin \epsilon}{\sin \beta}+\frac{R'' \tan \delta' \sin \theta}{\sin \beta}. \quad (2)$$

Formulas (1) and (2) may be rewritten as follows:

$$TH=\frac{R' \cos \epsilon \tan \delta}{\sin \beta}+\frac{R'' \cos \theta \tan \delta'}{\sin \beta}. \quad (3)$$

$$HS=\frac{R' \sin \epsilon \tan \delta}{\sin \beta}+\frac{R'' \sin \theta \tan \delta'}{\sin \beta}. \quad (4)$$

In equations (3) and (4), *TH* and *HS* are in linear units corresponding to those used for R′ and R″. The sign of each right hand member of the equations depends on the direction in which δ or δ' is measured and must be determined by inspection. In the situation illustrated in figure 2, both δ and δ' are negative in range effect, while in lateral effect δ is positive and δ' negative. Representing *TH* and *HS* by the terms $\triangle R$ and $\triangle L$, respectively, and dividing by R (which represents target range from G), we get—

$$\frac{\Delta R}{R}=\frac{R'}{R}\times\frac{\cos \epsilon}{\sin \beta} \tan \delta+\frac{R''}{R}\times\frac{\cos \theta}{\sin \beta}\tan \delta'$$

and

$$\frac{\Delta L}{R}=\frac{R'}{R}\times\frac{\sin \epsilon}{\sin \beta} \tan \delta+\frac{R''}{R}\times\frac{\sin \theta}{\sin \beta}\tan \delta'.$$

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20. Determination of disk and platen scales.—*a.* The deviation disks provide that the scale of the spotting platen in yards to the inch may vary in such a manner that a fixed distance in inches will be equal to 1 percent on the gun-target range. The variable scale

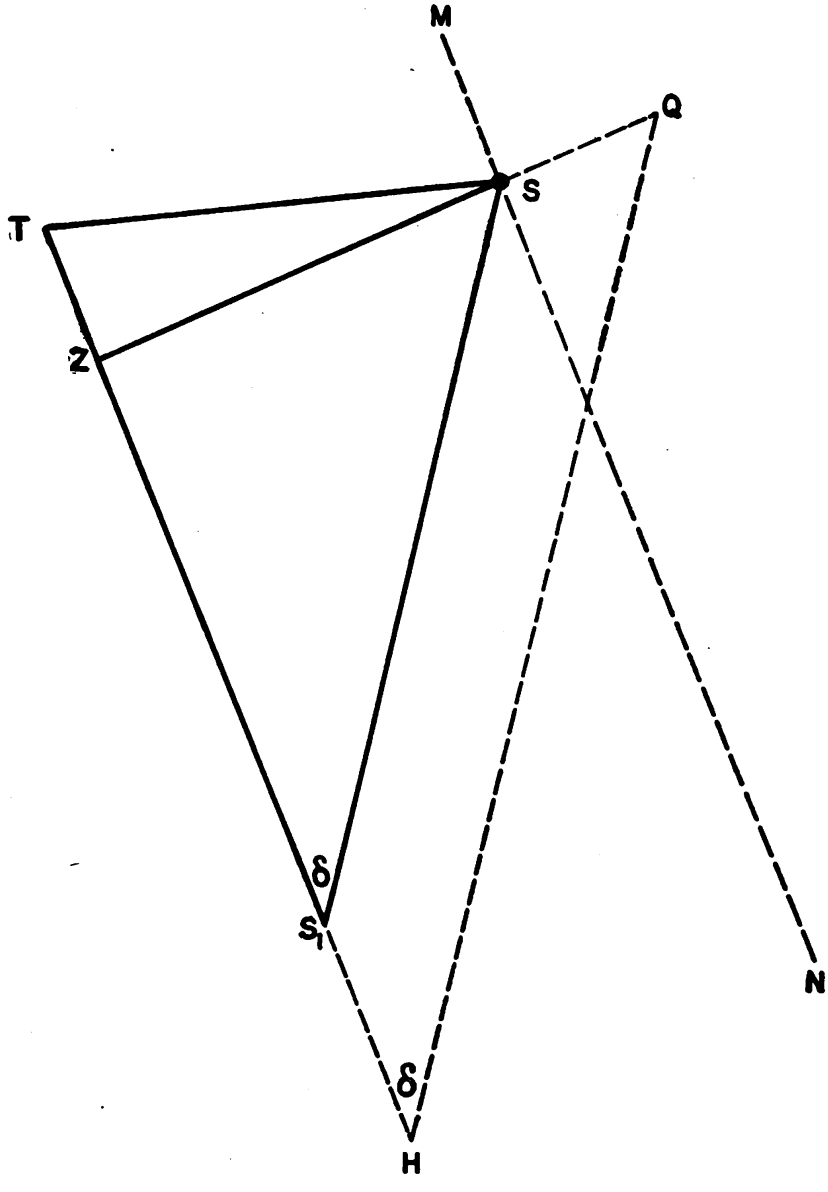

FIGURE 3.—Formula for calculating deviation.

selected for this platen was chosen as a function of the range so that $1'' = \frac{1}{2} \times \text{range} \times \tan 1°$.

b. The line S_1T of figure 3 is represented on the spotting board by the fiducial edge of the deviation arm when in its normal position. When setting into the board a particular angular deviation δ, the deviation arm is moved parallel to its normal position so that its

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fiducial edge would be represented by the line MN. SZ then, perpendicular to these lines, represents the distance the deviation arm has moved. Now $SZ=\frac{SZ\times 100}{R'}$ percent of the range S_1T. Since SZ equals R' tan δ (approximately), we may say that SZ expressed as a percentage of R′ is equal to 100 tan δ. If $\delta=1°$, tan $\delta=.0175$, and $SZ=1.75$ percent of R'. Hence if the line SZ were graduated to a convenient scale, say $2''=1.75\%=1°$, the angle would intercept on SZ a value expressed as a percentage of R'. In figure 3, TS_1 has been produced to H so that $TH=R$. Through H a line has been drawn parallel to S_1S intersecting SZ produced at Q. Hence QZ gives, on the same scale as SZ and expressed as a percentage of R, the magnitude of the deviation corresponding to the angle THQ.

$$SZ=R' \tan \delta$$
$$QZ=R \tan \delta$$
$$SZ=\frac{R'}{R}QZ$$

That is (remembering that the line SZ is graduated in percent), the percentage of R represented by SZ is R'/R times the percentage of R represented by QZ. Now if the segment SZ is to represent the same percentage of R as is now represented by QZ, the scale in which SZ is graduated must be changed so that on the new scale any given subdivision, say, that corresponding to 1°, will be R'/R times the corresponding subdivision on the old scale.

c. The value of SZ expressed in percent of the range from the gun is plotted along a diameter of the deviation disk to the scale of $2''=1°=1.75$ percent up to values of $\delta=1.85°$ on both sides of the center. This diameter is marked 10 on the edge of the disk. If the ranges R and R' were always equal, this scale would be all that was required, for all ranges and all values of δ, within limits of the disk. But, since the ranges from the spotting station generally are different from the ranges from the gun, it is necessary, as shown above, to multiply the scale of SZ by R'/R in order that it may be expressed as a percentage of R. This may be accomplished as follows: The outer edge of the deviation disk is graduated logarithmically in "Range from the spotting station" beginning at the 10 mentioned above and working backward to 1 and forward to 50. The outer ring, which is fixed in position, carries a similar scale labeled "Range from the gun." Draw other diameters on the disk corresponding to the logarithmic scale. Graduate each diameter on the basis of its relation to the diameter at 10 where $R=R'$ and 2 inches=1°. At 7.5, for example, $R'/R=7.5/10$ and the scale will be 1°=2 inches$\times$7.5/10=1.5 inches. After a convenient number of diameters are graduated, the points

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corresponding to a given observed angular deviation may be joined to produce the family of spiral curves. Thus when $R=25{,}000$ and $R'=30{,}000$, if we set 30 against 25, the result will be 1.2, and the diameter drawn through 12 will be perpendicular to the spotting station arm. In this position 1° will be equal to 1.2 times $2''=2.4''$.

d. It should be noted that with a scale such as $2''=1.75$ percent$=1°$ it is possible to read results in either percent or degrees. The face of the platen is graduated so that deviations in range are measured in percent of the range from the gun while deflection deviations are measured in degrees. In order that the board may be used for fire adjustment by the corrections method, the scales are numbered in the reverse order from that used on standard deviation and deflection scales. Due to this reversal, the readings in reference numbers now obtained are not deviations but corrections, which if applied to the impact under consideration would give a hit or normal (300) readings. The scale for deflection corrections is $2''=1°$. Vertical lines are drawn across the platen parallel to the gun-target line according to this scale, the minimum interval between lines being $.2''=.1°$. The scale for range percentage corrections is obtained from the ratio $1.75/1=2/x$ or $x=1$ percent$=1.143$ inches. Horrizontal lines are drawn across the platen perpendicular to the gun-target line according to this scale, the minimum interval between lines being .1 percent$=$ $.1143''$.

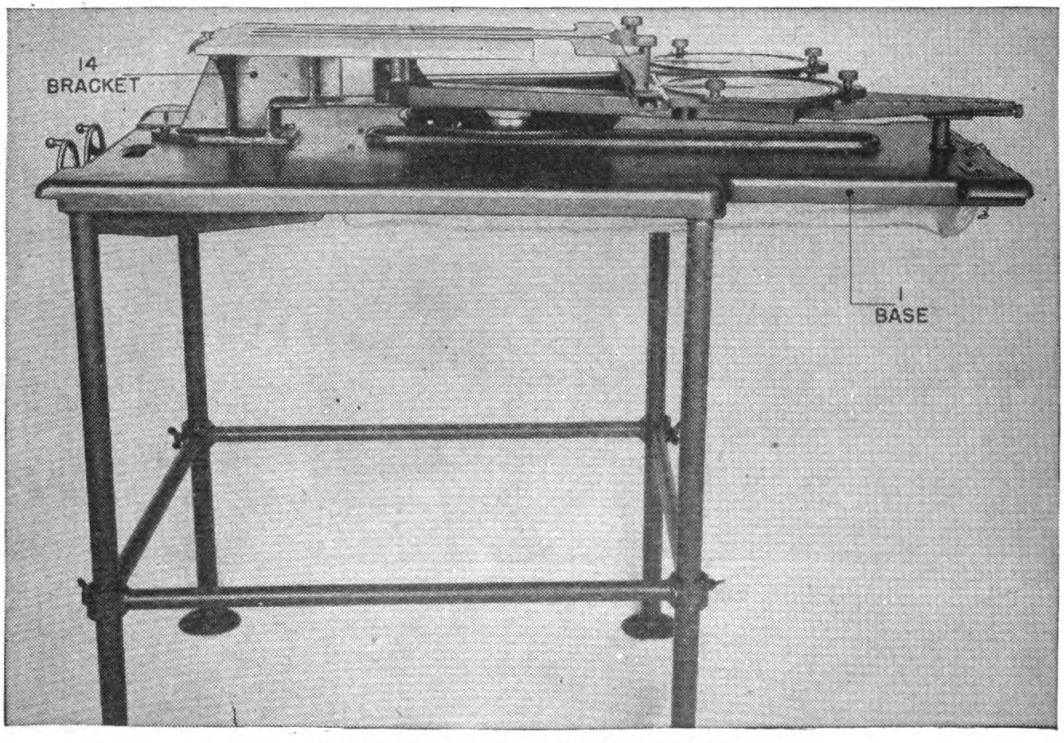

FIGURE 4.—Spotting board M3, side view.

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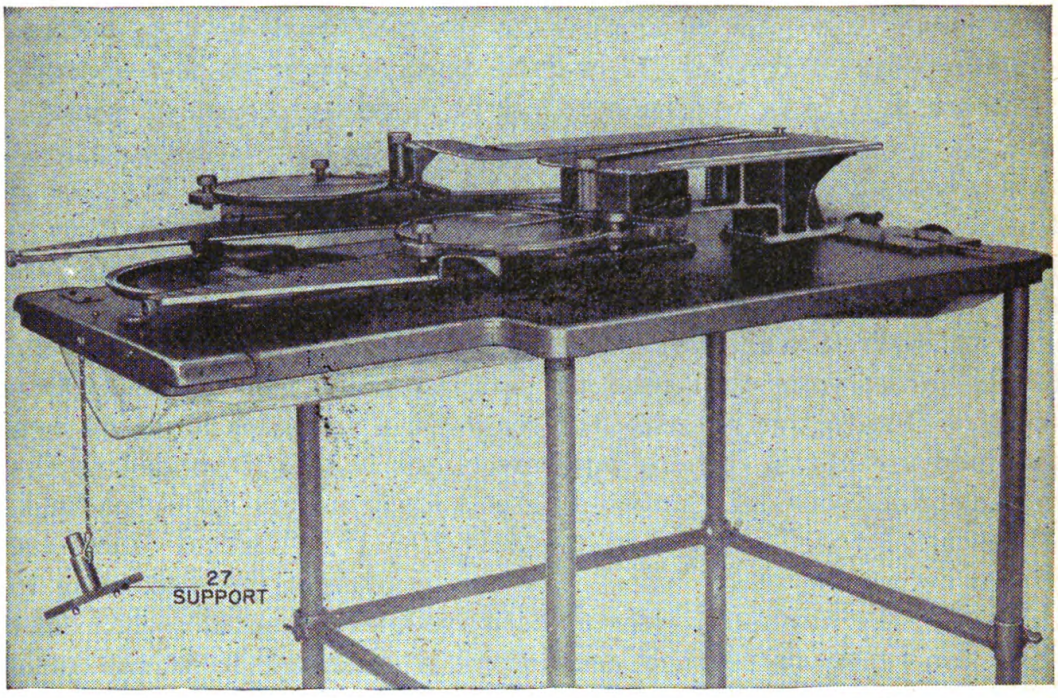

FIGURE 5.—Spotting board M3, rear view.

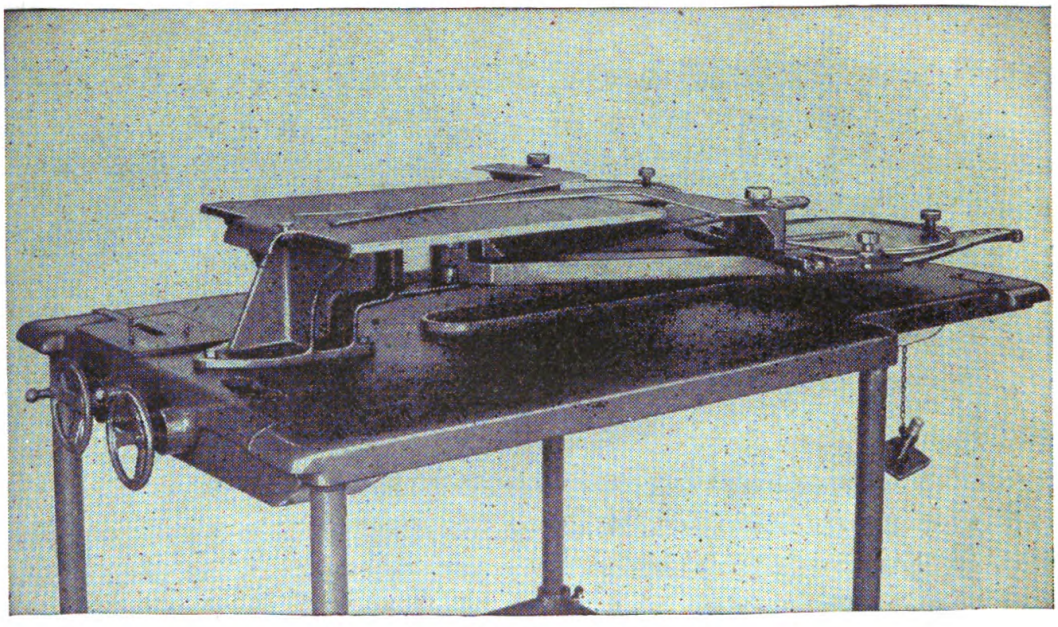

FIGURE 6.—Spotting board M3, front view.

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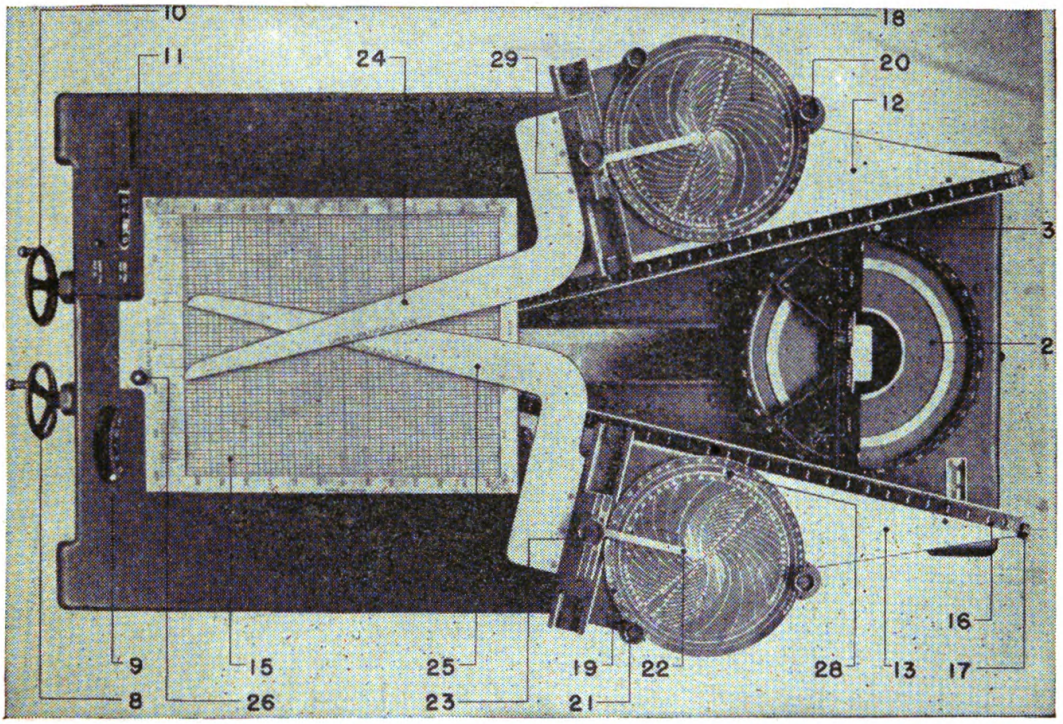

NOTE.—For latest arrangement of scales on platens see figure 11.

2. Plate, station arm.
3. Targ.
8. Handwheel, azimuth.
9. Scale, azimuth.
10. Handwheel, range.
11. Counter, range.
12. Arm, right spotting.
13. Arm, left spotting.
15. Platen.
16. Scales, spotting station range.
17. Knob (for setting scale (16)).
18. Disk, deviation.
19. Scale, "range from gun."
20. Knob (for setting disk (18)).
21. Knob (for setting gear (28)).
22. Pointer.
23. Knob (for setting pointer (22)).
24. Arm, upper deviation.
25. Arm, lower deviation.
26. Plunger.
28. Gear (index).
29. Screws, pointer.

FIGURE 7.—Spotting board M3, top view.

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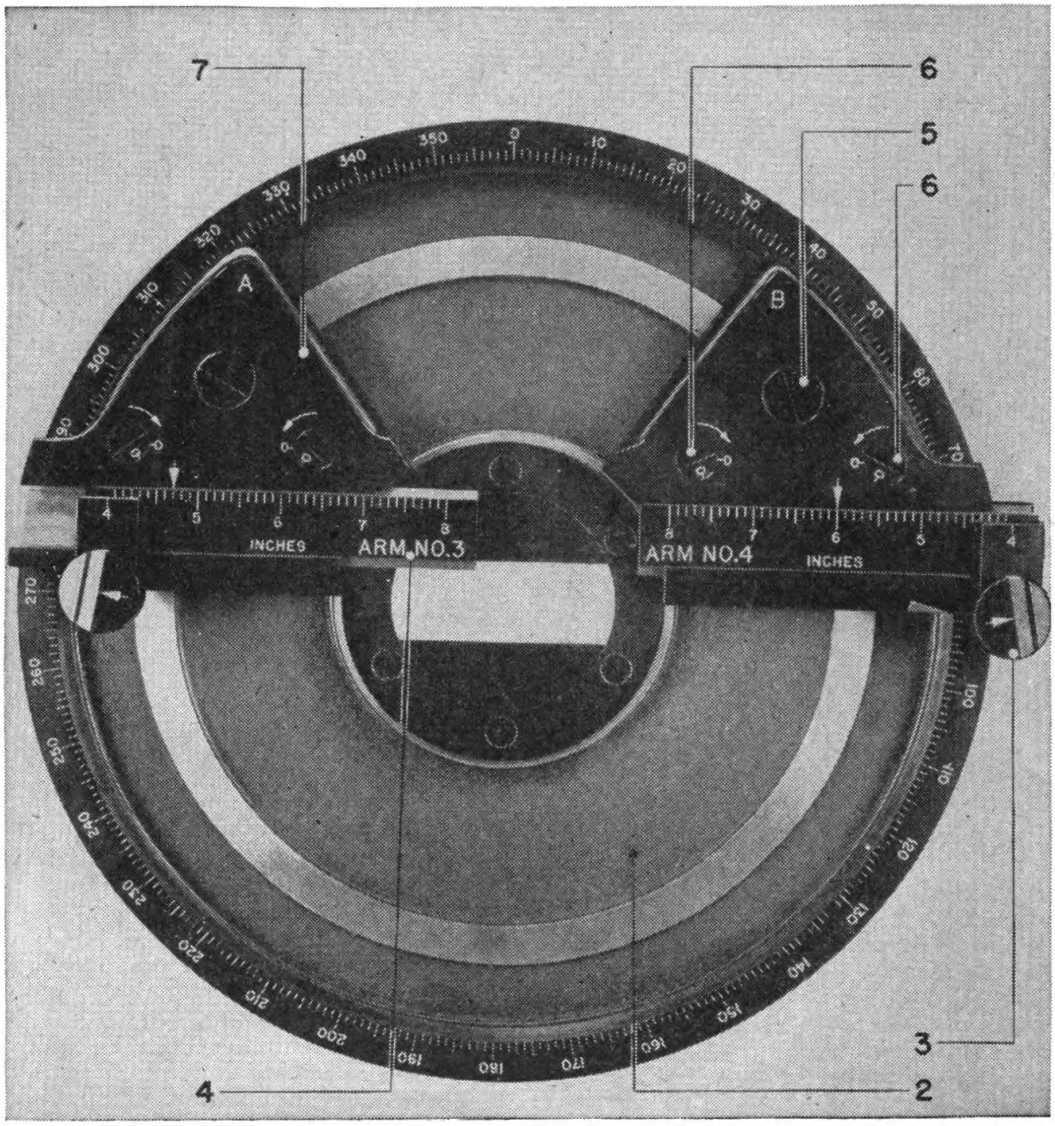

2. Plate, station arm.
3. Targ.
4. Arm, spotting station.
5. Screw (for clamping guide 7).
6. Pins, eccentric (for clamping arm 4).
7. Guide.

FIGURE 8.—Spotting board M3 station arm plate.

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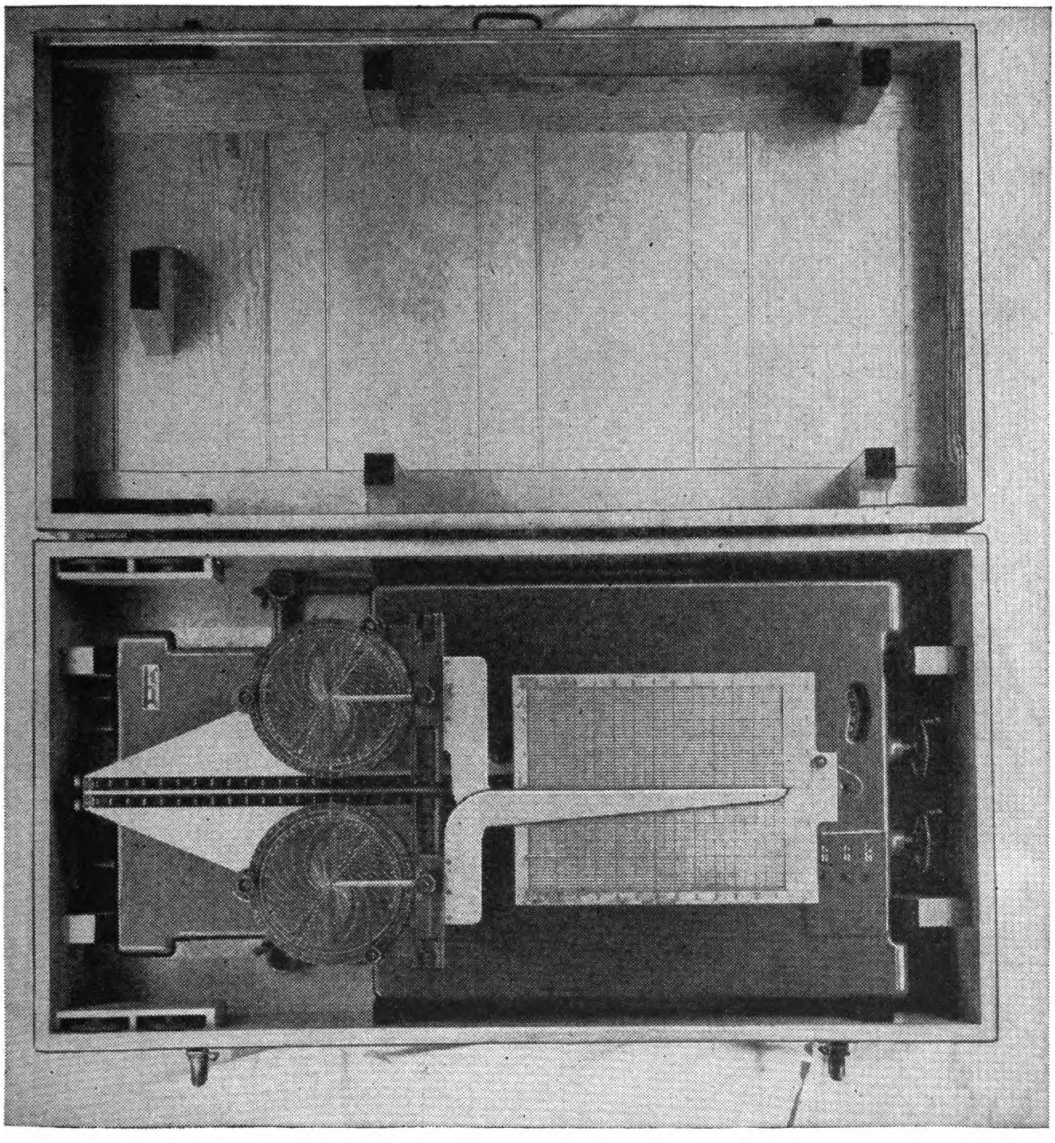

FIGURE 9.—Spotting board M3 in packing chest.

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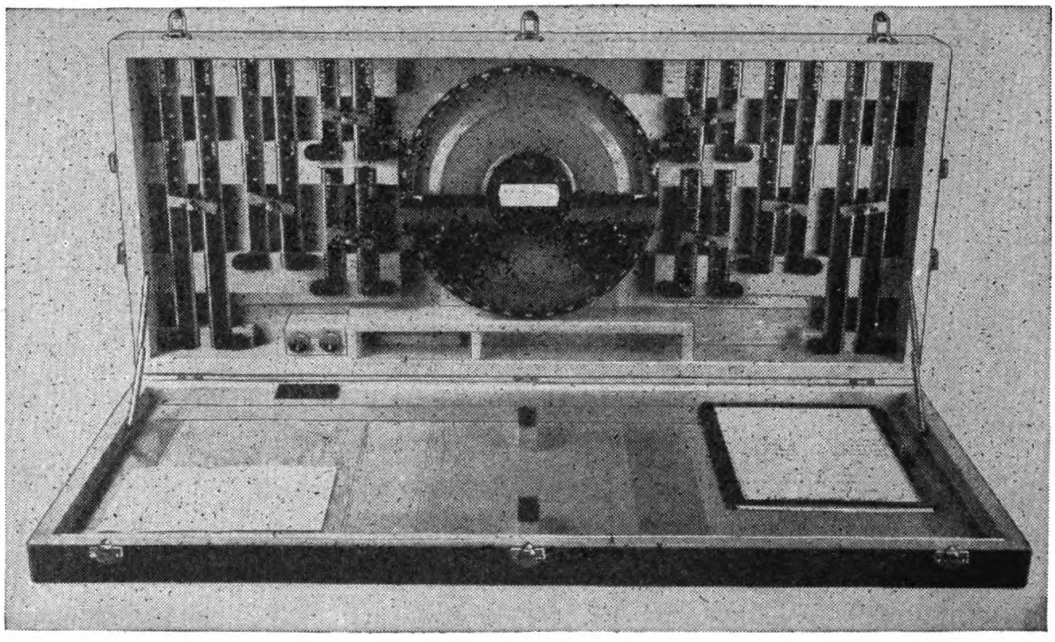

FIGURE 10.—Spotting board M3 accessory chest.

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SPOTTING BOARD M3

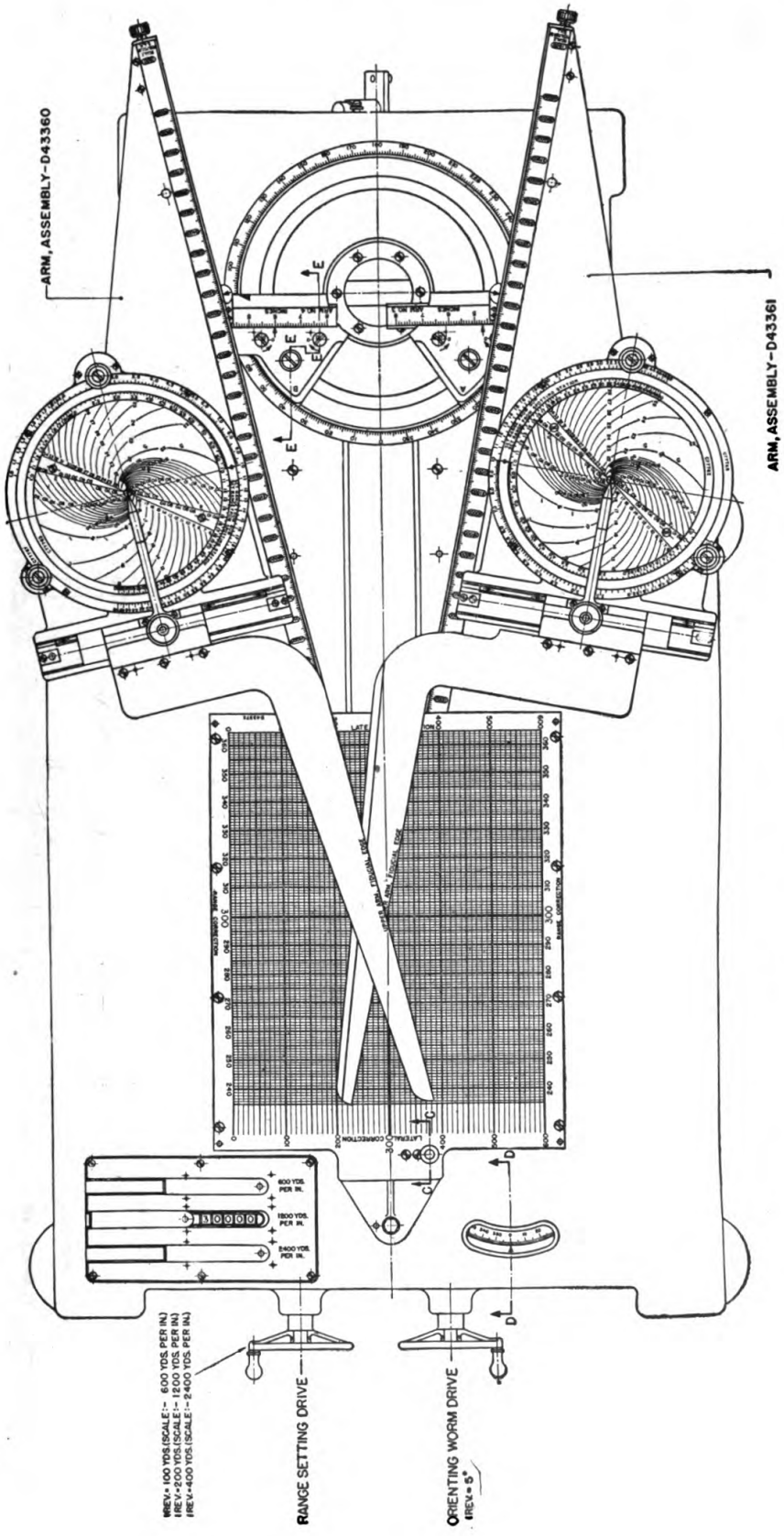

FIGURE 11.—Spotting board M3, assembled view.

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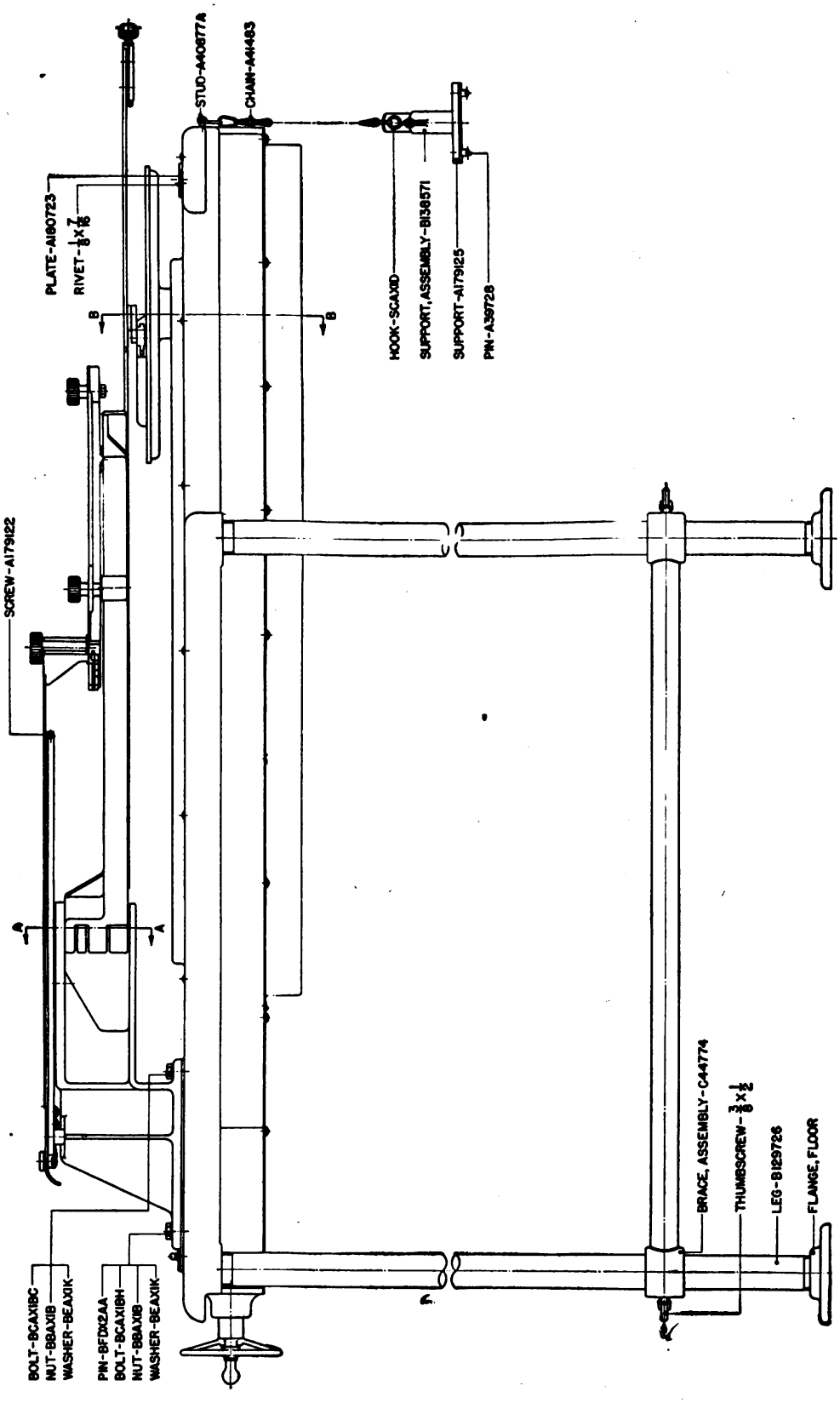

FIGURE 12.—Spotting board M3, assembled view.

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SPOTTING BOARD M3

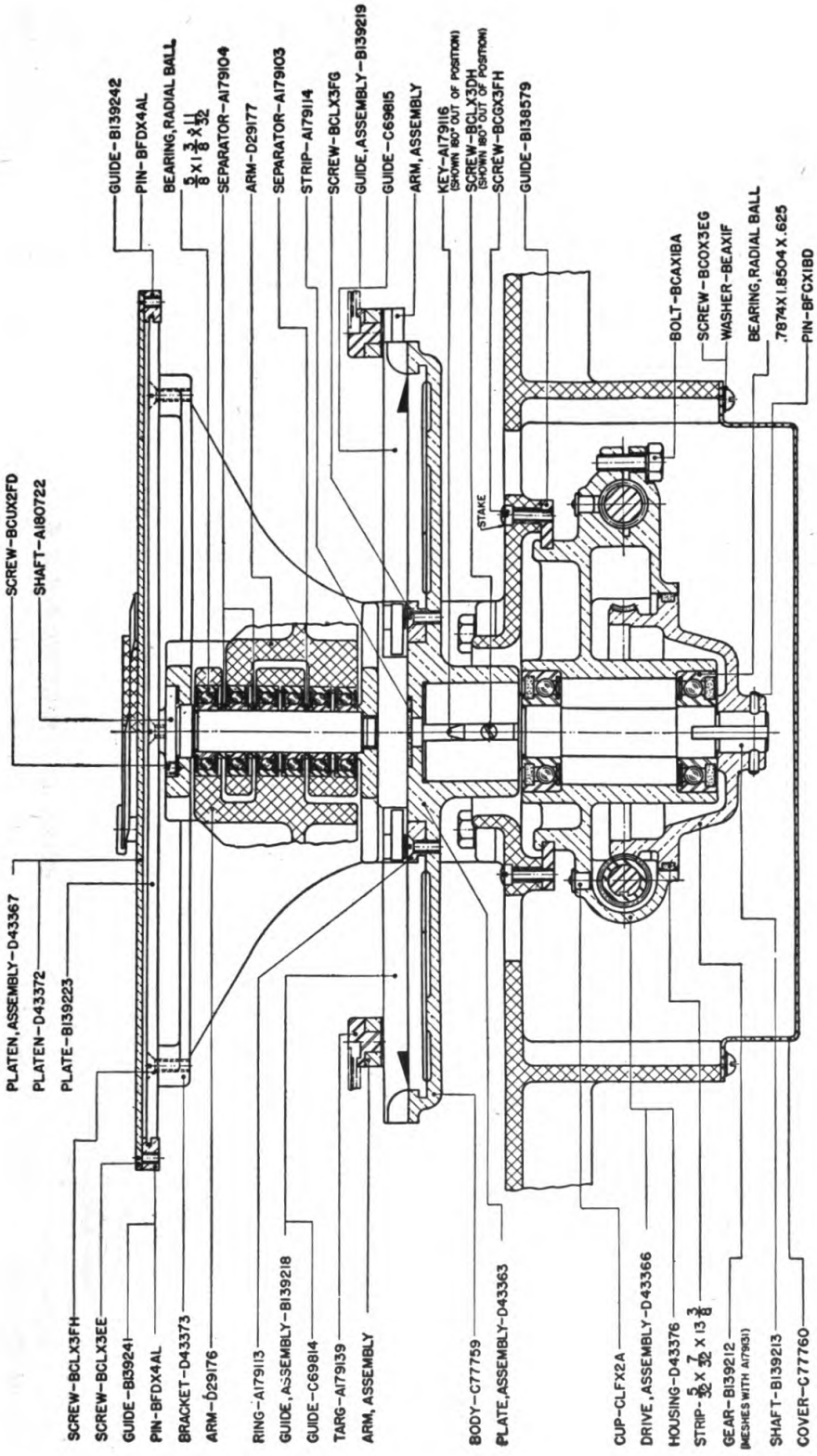

FIGURE 13.—Spotting board M3, sectional view.

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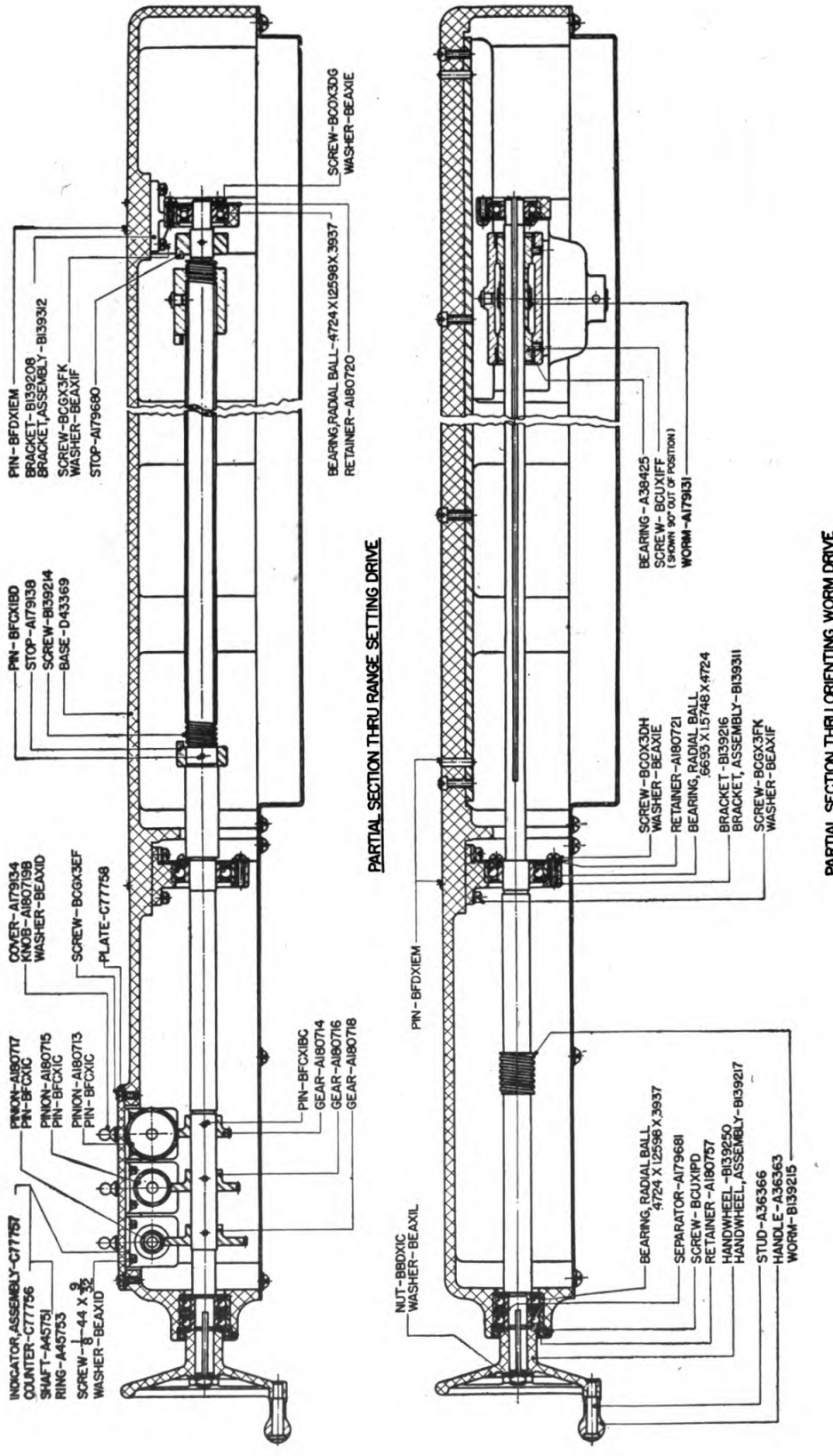

FIGURE 14.—Spotting board M3, sectional views.

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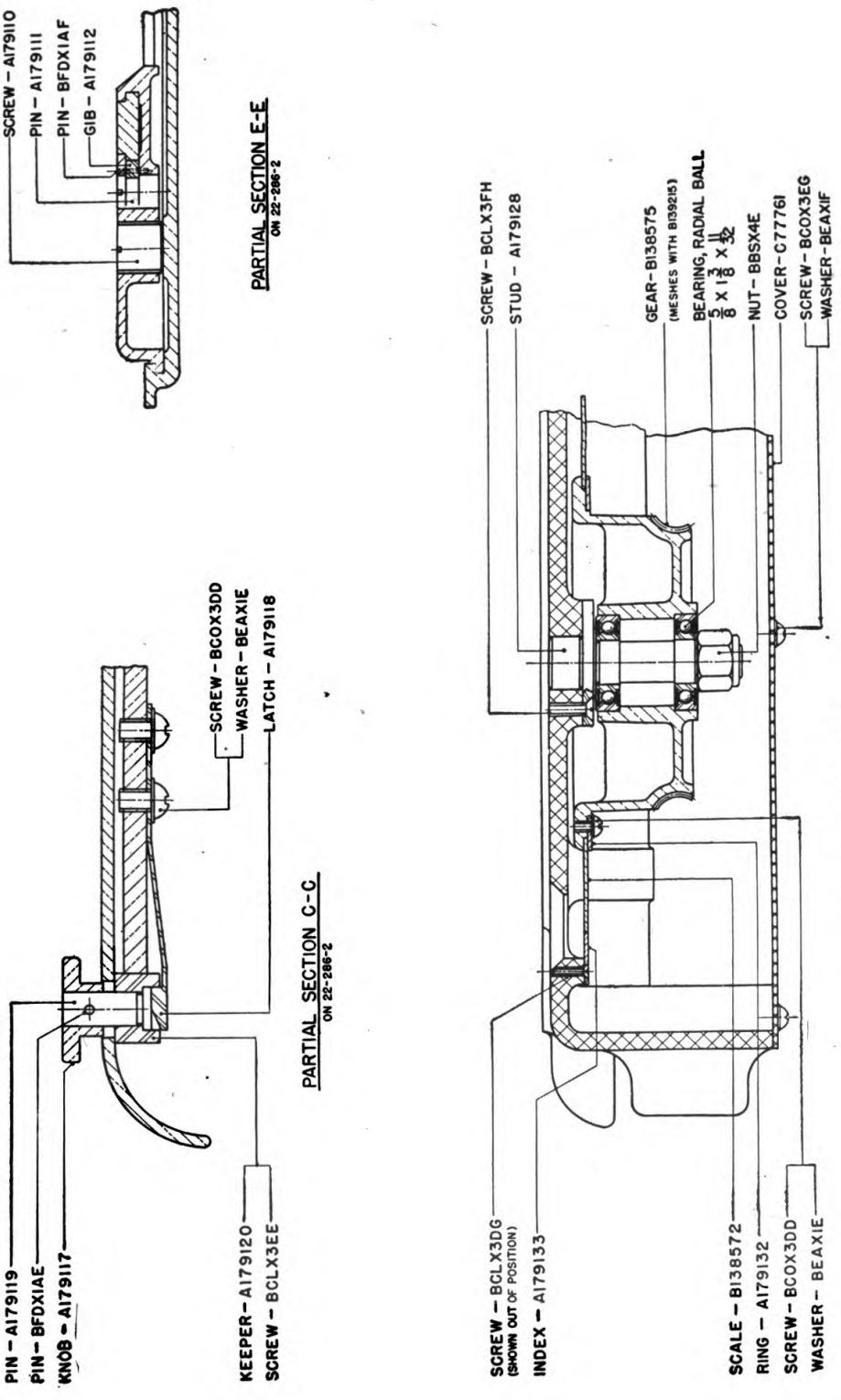

FIGURE 15.—Spotting board M3, sectional views.

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APPENDIX

LIST OF REFERENCES

Standard nomenclature list.

Antiaircraft sighting equipment and fire-control instruments, etc.....SNL F–2

[A. G. 062.11 (1–7–42).]

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(For explanation of symbols see FM 21–6.)

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